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## **A Case Study of Grape Production and Varieties in Lashkergah District, Helmand Province, Afghanistan**

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### **Abstract**

The study entitled “A Case study of Grape Production and Varieties in Lashkergah District, Helmand Province, Afghanistan was conducted in Lashkergah district of Helmand Province Afghanistan in 2018. The major objective of the study is to find out and analyze the grape production and cultivated varieties of the district. Out of all 250 villages of Lashkergah district, 20 villages were randomly selected for the study and from every village a total number of 10 grape growers were chosen randomly for interview in cooperation with the leader of the village. Both the quantitative and qualitative data were gathered from the study area. Growing area of grapes in Lashkergah is about

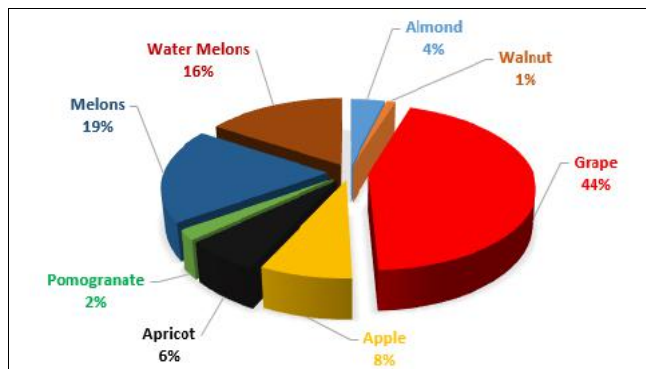
620 hectares, which 50% of the growing area is located in the village of Qala e bost, 20% in Kariz village, 20% in Sarkar village and 10% in Bolan village respectively. Average yield in the district per hectare is about 15 MT. Grapes varieties in Lashkergah Varieties uses for fresh grapes production Varieties use as table grapes (fresh grapes) of Lashkergah mostly contains national varieties such as Hussaini, Lal, Kata, Gholadan and Kandahari. The grape varieties which are mostly grown in the district are Hussiani, Cheshmi GAO 237, Shondakhanai sra 391, Kandahari 236 and Lal Sorkh 736.

**Keywords:** Grape, Production, Varieties, Training and Pruning

### **1. Introduction**

Afghanistan is an agrarian country in which more than three-quarters of the population live in the countryside in scattered towns and villages. The agriculture sector contributes up to 50 percent of the GDP depending on the weather. Agricultural production grew at over two percent per annum in the pre-conflict years from 1961-78, and fell to 0.2 percent per annum from 1978-2001 (World Bank, 2005). While a majority of the population is dependent on agriculture, non-farm employment, including processing of farm products as well as non-farm income is important in rural livelihoods. Horticultural activities have produced significant returns to farmers and traders. Grape production in Afghanistan is spread all over the country. Kandahar is one of the main grape producing provinces that produces 22% of the total grape production in South Eastern region. Central region, which covers Kabul and Helmand provinces, has the highest production of grape (31% of total grape production) in Afghanistan. In south, grape production is 14%, and Herat province in the West produces 9% of the total production (CSO, 2015)<sup>[10]</sup>.

According to a survey of the horticulture sector by Food and Agriculture Organization (FAO) in 2003, “grape has the highest orchard area and is the major fruit species in more than 15 provinces accounting for 48% of total fruit growing area of the country. However, in most districts of these provinces grape is not cultivated for commercial purposes”. The chart below shows that grape is the main fruit produced in Afghanistan.



Source: CSO, 2015

Fig 1: Fruits Coverage Percentage

Rising temperature and erratic rainfall pattern which are attributed to the varying climate have been the bane of the grape farmers all over the country. The variability of the climate in recent times has led to a reduction in grape production area as well as reduced yield with by frost killing of new growth of tissues, water deficiency during peak summer, vine and berries disease, etc. Since the reduction in grape production is a threat to food security with the potential to contribute to the risk of famine, there is the need for comprehensive research to explore the extent of the variability of the climate change on grape production. Also, grape production is a source of livelihood to most farmers in the district and since grape production is irrigated and dependent of glaciers and flow of rivers and streams, the

erratic rainfall pattern and high temperatures in the area has the potential to threaten the livelihoods of these farmers. Very little information is available in the area of climate variability and fruit production, especially grape in Afghanistan and the study area in particular, which is noted for its large-scale production of grape. Accordingly, the study was conducted to assess the impact of climate variability on grape production in the Lashkergah District of Helmand Province in Afghanistan.

The study was designed to assess the impact of climate variability on grape production and farmer's perceptions of the climate change. Geographically, the study is designed to cover the Lashkergah District which is vulnerable to climate variability with most of the people growing grapevines for their livelihood. The study involved majority of villages that produce a greater percentage of the grape in the district. Contextually, the study analyzed the trend of climate variability over the past years as well as how climatic variations affect grape production in Lashkergah District. The study also investigated how the farmers perceive the effects of climate variability on grape production in response to the impact of climate variability in district.

## 2. Materials and Method

Lashkergah city is mainly an agricultural district in which the main crops are wheat, maize, various vegetables and horticulture crops, some area is cultivated under peanut and cotton as well, the principal sources of irrigation are canals and tube wells.

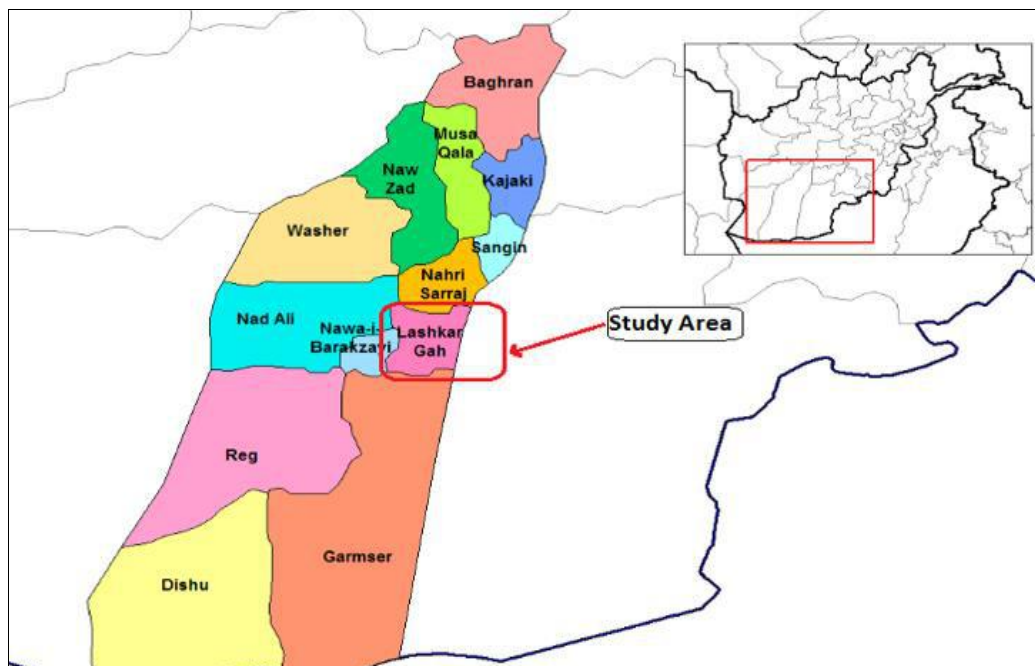


Fig 2: Map of Helmand province

To have adequate data for enabling of researcher in generalization of major results, both probability and non-probability sampling techniques were used for the study. The unit of analysis was individual grape growers from different villages in the district. However, the views of key informants such as the Agricultural Extension Officers and the Plant Pathology Officer of Agriculture directorate of the district were solicited. Out of all 250 villages of Lashkergah district 20 villages was randomly selected for study and from every village a total number of 10 grape growers were

chosen randomly for interview in cooperation with the leader of the village. Both the quantitative and qualitative data were gathered from the study area. Data used for the study were collected from both primary and secondary sources. Primary data were collected from key informants such as grape growers, Agricultural Extension Officers of districts while the secondary data were obtained from the Meteorological Department of Civil Aviation Authority and the Ministry of Agriculture, Irrigation and livestock (MAIL) respectively and also by desk study within review of

literatures. Farmers were interviewed using structured interview guides which had both closed and open-ended questions. The interview was conducted face-to-face with the respondents. The structured interview was deemed appropriate because most of the respondents in the study communities could not read and write the English language. In view of that, the questions were read out in their local dialect to facilitate better understanding and to respond to the questions appropriately. The interviews were conducted in the homes and in some cases on the farms of respondents where appropriate. The data for this study were processed and analyzed quantitatively and qualitatively. The quantitative data were analyzed using descriptive statistics with the help of Statistical Package for Social Science Software and the Microsoft Excel Software.

### 3. Results and Discussion

#### Grape Production in Afghanistan:

Grapes are grown widely throughout Afghanistan, most without trellising or other vine support, large area of plantation covering an estimated 78,681 hectares (SCO, 2016). The area under grape is 34% of the total fruit crop area. The central provinces (Kabul 22%, Parwan 15%) are the major grape producing area accounting for 37% of total production (Jalal, 2011) [27]. According to central statistics organization, Afghanistan, Production estimates for Afghan grape production in 2015 – 2016 was 805072 tons.

Grape play an important role in the economy of Afghanistan and have been cultivated for centuries. The average percentage of fruit production marketed by farmers indicates that grape is the most important crop. Grape in Afghanistan are mostly growing by traditional system called earth-trellised “Jui” system, freestanding head system, and now it’s practicing T and I (cordon) systems. Cultural practices and post-harvest processes are generally still traditional but a long-ago ministry of Agriculture Irrigation and livestock of Afghanistan and other national and international organizations are working for improvement of not only grape production but all agricultural products (Jalal, 2011) [27].

Grape are the major cultivated fruit species in more than 15 provinces, representing 48 percent of the country. Koh-e-Daman wich includes parts of Kabul, Parwan and south western tip or Kapisa province, and northern portion of Kandahar province presents the major grape/raisin production area. Herat in the southeast, and Ghazni in the eastern part of the country. Faryab and Sar-e-pul in the North also can be counted as high producing provinces.

The country has indigenous grape genetic resources of excellent quality that are cultivated almost everywhere. The core of the local varieties collection is in selected nucleus nurseries and research stations. The production of seedless grape varieties (called "kismish"), which are dried for the raisin export market, is still common, especially in the southern region. Unfortunately, this activity was badly affected during war with the destruction of a large number of grape drying houses

In Afghanistan the grape production takes place in traditional “jui” or ‘earth-trellised’ vineyard system which is the main grape production system in the country. However, the new systems of training vine and grape production in wire trellis system has newly emerged as the new technique for grape production. The establishment of the vines on a ‘jui’ system takes four years, after which

production in subsequent years will be largely the same. Afghan grape growers use the jui production system because they believe it protects the grape from heat and wind damage (Lister and Brown, 2004). Besides the traditional system of grape production was adopted to very cold freezing environment of Afghanistan that could protect the grapevine from sever damages of freezing the trunk during the winter season. It is the system that has been used since antiquity so it carries a strong inertia of tradition as well. It also affords support to vines with earth, a material that is perceived as cheap.

#### Grapes and its nutritional value

Grapes commonly known as grapevine (*Vitis vinifera* L.) is one of the old fruit crops belongs to the family of Vitaceae is a liana with flaky bark. Grapes used as its raw form or used by making juice, jam, jelly, vinegar, wine, grape seed oil, raisins and grape syrup. Grapes contain different compounds having medicinal and health promoting affects. Grapes have antioxidant activity due to their phenolic contents, they have shown good source of phenolic antioxidants (115 and 361 mg/kg of total phenolics).

#### Grape Production in Lashkergah

Growing area of grapes in Lashkergah is about 620 hectares, which 50% of the growing area is located in the village of Qala e bost, 20% in Kariz village, 20% in Sarkar village and 10% in Bolan village respectively. Average yield per hectare is about 15 MT. Grapes varieties in Lashkergah Varieties uses for fresh grapes production Varieties use as table grapes (fresh grapes) of Lashkergah mostly contains national varieties such as Hussaini, Lal, Kata, Gholadan and Kandahari. (Samadi, 2011).

Varieties uses for raisin production Varieties use for raisin production are mostly Shondakhanai and Keshmeshi (according to believe is the original variety counted as Thompson seedless and sultanina), Mehr Amadi, black Keshmeshi, lal and etc (Samadi, 2011).

Due to a classification made by Afghanistan National Nursery Growers Organization (ANNGO, 2013) [3] afghan grapes are grouped to below sub groups: Hussaini cultivars group one of the commonly grown group of cultivars from central Afghanistan. The group matures in late August in Kandahar and Helmand provinces. Bunch is medium in size. Berry color is green-yellow and seed is well developed. The group has good fresh market in Kabul and other provinces and also exported to Pakistan. Ayta cultivars group one of the well-known cultivar grown in Helmand, Herat and Kandahar provinces. The group matures at the end of August in Kandahar and Herat. The size of the bunch and berry is medium. The color of berry is green-yellow. Seed is well-developed. The group has good fresh and dry market.

The group consists of varieties imported from USA and the mother trees are grown in Laghman province. Some of the varieties in the group has impressive local and international market (flame seedless, Black emerald, red globe and ribier). Perlette is the earliest variety matures in mid-July in Kandahar while Crimson seedless matures in last week of September. The bunch and berry size are small to medium. Berry color varies for each variety.

Miscellaneous cultivars group: Roucha safid is the earliest local cultivar matures in late June. The bunch of Roucha is small and more compact also the size of berry is small. Keshmeshi sorkh is good for drying it matures late August.

Its raisin has a good local market. Lal Katta Dana has medium bunch and berry size it has good fresh market (ANNGO catalogue 2013-2014) [4]. Some of the grape varieties and its characteristics in Lashkergah.

#### **Hussaini 504**

Commonly grown group of cultivars in Lashkergah. Bunch is medium in size. Berry color is green-yellow. Seed is well developed. Group has a good fresh market. Flowering time 1st of May Mature in late august.

#### **Cheshmi GAO 237**

Flowering time: 2nd to 3rd week of May Ripening time: 3rd week of July Bunch size: small Berry size: big Berry color: green yellow Seed presence: present Sugar Content: 16 Brix Overall: mid variety, very sweet, good for fresh market.

#### **Shondakhanai sra 391**

Flowering time: 4th of April Maturity time: 2nd week of July.

#### **Kandahari 236**

Flowering time: 4th week of April Ripening time: 3rd week of June Bunch size: small Berry size: medium Berry color: dark red Seed presence: present Sugar Content: 13 Brix Overall: early variety, it is very sweet and juicy.

#### **Lal Sorkh 736**

Flowering time: 1st to 3rd week of May. Ripening time: 4th week of July Bunch size: small Berry size: medium Berry color: red Seed presence: present Sugar Content: 23.5 Brix Overall: best for fresh consumption.

Growing season for grapes is standardly 150-180 days but for short season varieties it's about less than 150 days and for long growing season's varieties it's about 200 days. Grapevine chilling requirement (cold weather before flowering and growth in spring, for buds opening) is 100 hours between 0 – 7, 2 °C.

Vine yards are mostly irrigated with canals and karez (qanat) irrigation systems although a low percentage consists of spring rainfall and wells. Vine yards irrigated with in the intervals of 10-15 days with flooding irrigation system.

#### **Training and pruning**

Pruning of grapes is practicing by two types in the district as shown below.

1. Spur pruning: In spur pruning leave 2-4 buds on shoots. Spur pruning is mostly applicable for varieties that buds on the bases of shoots have the ability to produce fruit. Such as Taifi. Generally, all varieties with fruits containing a seed is pruned by spur pruning.
2. Cane pruning: In cane pruning more buds to be lifted on shoots and as it takes the shape of a cane due to its called cane pruning. It's divided by two types.
  - a. Short canes: buds to be lifted 4-7
  - b. Long canes: buds to be lifted 8-15
 Cane pruning is mostly appropriate for varieties that buds on the bases of shoots are not capable to produce grape fruit or buds near to the bases of shoots don't have sufficient production such as Kishmeshi, Shondakhanai, flame seedless and etc. Usually cane pruning is mostly suitable for varieties that they have seedless berries.

#### **Training**

##### **1. Earth-trellised "Jui" system**

Earth-trellised "Jui" system is the main grape production system in the country. The establishment of the vines on a 'jui' system takes four years, after which production in subsequent year will be approximately the same.

##### **2. Freestanding head system**

This is a traditional training system of grapes that don't need a trellis. Freestanding training system is consisting of a strong and straight trunk containing 4-5 canes (arms), supporting their self. Grapevine trained by this system need a stick for the period of 3-5 years to support the trunk and further stick is not needed anymore and grapevine can be stable and is able to support their self. Yield in this system is less in comparison with trellis system. Collection of grapes trained by freestanding-head system is practiced by hand.). Fruit producing branches grow directly on the trunk and it can be pruned by spur or cane pruning. (Samadi, 2013).

##### **3. Trellising system**

Two common trellising systems are consisting of:

- a. I- trellising (vertically shoot posilimal trellis and or cordon training system).
- b. T- trellising
  - a. I- trellising: Training by I-trellising system is mostly applicable for varieties pruned by spur pruning. This system contains a wire 50-60 inches above the ground on which the grapevine is trained; also, above of the cordon wire there are 1-2 wires for keeping the branches. Yield by I- trellising is high and harvest can be done easily by machine. This system is useful for varieties use for raisin production.
  - b. T – Trellising: t-trellising system is applicable for both spur and cane pruning varieties. T- Trellising training system is mostly useful for varieties used for fresh grapes production, but is also useful and applicable for varieties of raisin production. Generally, stick wire which has the shape of T is located 170 cm above the ground and there are 4-5 wires with the distance of (20-25 cm) that cover an area of 1 meter (Samadhi, 2013).

#### **4. Conclusion**

From the findings of the study the following conclusion is derived.

1. Grapes are grown widely throughout Afghanistan, most without trellising or other vine support, large area of plantation covering an estimated 78,681 hectares.
2. Grapes have antioxidant activity due to their phenolic contents; they have shown good source of phenolic antioxidants (115 and 361 mg/kg of total phenolics).
3. In Afghanistan the grape production takes place in traditional "jui" or 'earth-trellised' vineyard system which is the main grape production system in the country.
4. Growing area of grapes in Lashkergah is about 620 hectares, which 50% of the growing area is located in the village of Qala e bost, 20% in Kariz village, 20% in Sarkar village and 10% in Bolan village respectively.
5. In the district, the average yield of grape per hectare is about 15 MT Grapes varieties in Lashkergah that uses for fresh are Hussaini, Lal, Kata, Gholadan and Kandahari.
6. Pruning of grapes in Lashkergah is practicing by two types that is Spur pruning and Cane pruning. In spur



pruning leave 2-4 buds on shoots and in cane pruning more buds to be lifted on shoots and as it takes the shape of a cane.

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